ATTACHMENT 2-9
IG CONTAINER MANAGEMENT PLAN

1.0 INTRODUCTION

1.1 This attachment provides information about the management of containers in Igloo G as required by R315-8-9.

2.0 IGLOO G PROCESS INFORMATION

2.0.1 Dugway Proving Ground (DPG) operates Building 3643, Igloo G, primarily for the storage of waste chemical warfare materiel (CWM).

2.0.2 Igloo G is used for container storage of range recovered munitions (RRM), which are known or suspected to contain chemical warfare materiel and the hazardous waste codes listed in permit condition III.B. Each RRM will be individually characterized using the waste analysis process outlined in Attachment 2-1. This section provides a description of how the design and operation of Igloo G, the containers used to store hazardous wastes, and the secondary containment systems are combined to prevent the release of hazardous waste to the environment.

2.0.3 Igloo G is located near the Carr Facility approximately 11.5 miles west-southwest of English Village as shown in Attachment 2-5 of this permit. Igloo G was constructed in 1965 and is a typical example of a Department of the Army, earth-covered, munitions storage magazine. The igloo is a fully enclosed structure of concrete and steel construction. The igloo has interior floor dimensions of 80 feet by 26 feet (2,080 square feet). The floor of the igloo is constructed of reinforced concrete and has a nominal thickness of 6 inches. 18-inch deep and 12-inch wide reinforced concrete beams, spaced 10 feet apart, support the floor. These massive supports provide a live load capacity of 2,000 pounds per square foot (psf), according to the U.S. Army Corps of Engineers specifications (Stradley Magazine Sheet 8). Access to the igloo is limited to a single set of steel sliding doors located in the center of the front (east) wall. Drawings of Igloo G are presented in Exhibit 2-3 (9 plates).

2.0.4 Igloo G is used primarily for the storage of containers of non-waste chemical agent, which are not regulated. Igloo G is also used for the storage of containerized hazardous waste RRMs. The RRMs are stored in a section of Igloo G that is separated from the hazardous waste research chemical agent by a portable blast wall. The RRMs containing CWM are currently sorted into three groups. The first two groups are projectiles with fuzes in place and projectiles without fuzes. The third group of RRMs currently consists of bombs, which contain neither burster tubes nor fuzes, and are not classified as D003 wastes. The entire floor space of Igloo G is not currently used. However, the remaining floor space will be used when and if additional munitions, which are known or suspected of containing CWM, are discovered during inspections of the DPG test ranges and are considered safe for transport and storage. Figure 9-1 is a plan view of Igloo G and the loading/unloading area outside the doorway. Figure 9-2 is an example of a location key for an Igloo G planigraph and shows the potential storage locations for each RRM. Four-letter designations of storage locations are assigned for each RRM. Freestanding signs shall be used to designate limits of the floor area used for RRM storage.

2.1 Description of Containers: R315-8-9.2, R315-8-9.3

2.1.1 DPG considers the primary container for the hazardous waste to be the outer steel casing of the RRM itself. The RRM containers currently in storage consist of projectiles and bombs. The CWM (P999), igniting fuse (D003), and bursting charge (D003) are all situated within the steel casing of the projectile or bomb. Individual RRM overpack containers may not actually contain all three types of hazardous waste. Some of the historical RRM inventory are still classified as "unknown" with regard to the chemical fill, and "new" RRMs placed in Igloo G in the future may also be "unknown" or "suspected" P999 until completion of the waste analyses or examinations described in Attachment 2-1 of this permit. If RRMs are determined to contain no CWM, they will be proposed for removal from the igloo, after review and concurrence by the Executive Secretary.

2.1.2 The RRM containers currently being stored vary greatly in size. The amount of hazardous waste present will be measured by weight, where the entire weight of the RRM is considered to be waste material. Weight, rather than volume, is used to define waste quantity since the UDSHW considers each RRM, as a whole, to be hazardous waste. Table 9-1 provides the approximate dimensions and weights of each type of RRM in storage in Igloo G in early 1995, Table 9-1 is not an inventory. Munitions recovered from the test ranges in the future may be different in configuration, size and weight from the containers currently in storage. The actual number of containers of waste, which can be stored in Igloo G, will depend on the sizes and weights of RRMs discovered in the future. However, Igloo G will be limited to the storage of a total of 4,160,000 pounds of hazardous waste and non-waste chemical agent (combined weight) as long as the aisle space and stacking limitations described in Section 2.2 can be met.

2.1.3 Fuzes and bursters have been removed from some RRMs. Other RRMs may contain fuzes and/or bursters in various conditions, which have not been removed due to corrosion or impact damage. Corrosion and impact damage may prevent safe removal of explosive components. RRMs, which contain explosives, are stored with other RRMs, but are separated from containers of chemical agent by sand and/or steel blast wall between.

2.1.4 The RRMs, which are considered projectiles are placed in steel propellant (prop) charge cans or in "pigs." Both containers have a solid steel bottom and a gasketed steel-end cap. The end cap is screwed on the prop charge cans while the end cap for the pig is bolted on. The pigs are of a heavier construction compared to prop charge cans. The prop charge cans vary in size up to approximately 10 inches in diameter and 70 inches long. The prop charge cans and pigs are considered part of the secondary containment system for those RRMs, which maintain structural integrity and do not leak. In the event that an RRM were to leak, the prop charge can or pig becomes the primary containment and a second overpack pig then provides secondary containment. RRMs in steel prop charge cans are in plastic bags. Figure 9-1 shows gross weight of individual munitions stored at Igloo G. A typical propellant charge can be used for the storage of RRMs, which contain 155-millimeter and 8-inch projectiles is shown in Figure 9-4. Figure 9-5 shows a container typically used for the storage of RRMs, which contain 105-millimeter projectiles and 4.2-inch mortar projectiles. Containment pallets will be placed under all hazardous waste containers including RRMs and other types of containers. A typical pallet is shown in Figure 9-6.

Table 9-1.
Gross Weight of Individual Munitions Stored at Igloo G.

Munition Type	Gross Weight per Round (lbs)	Potential Agent in Round	Capacity (lbs)
4.2-inch Mortar without fuze	27.06	Unknown	5.75 - 8.0
4.2-inch Mortar with fuze	28.66	Unknown	5.75 - 8.0
4.2-inch Mortar without fuze	22.77	H	6.0 - 6.5
CTG 105-mm without fuze	39.92	Unknown	3.17
CTG 105-mm M60 without fuze	42.92	H	3.17
CTG 105-mm without fuze	40.77	H	3.17
Projectile 155-mm T77 without fuze	Unknown	G	6.5
Projectile 155-mm T77 without fuze	98.9	GB	6.5
Projectile 6-inch/47 Navy without fuze	105.0	G	10.4
Projectile 155-mm	98.9	GB or VX	6.0 - 6.5
Projectile 155-mm M107	94.6	Unknown	6.0 - 11.7
Bomb Gas AN-M79	926.0	Unknown	195 - 351
Hemisphere M139	2.14	GB	1.1
Bomb Gas M125	8.5	GB	2.6
Projector Levins	61.0	Unknown	28.0

G exact agent unknown, but thought to be in the G family of agents
GB Isopropyl methylphosphonofluoridate (or Sarin)
H Levinstein Mustard
lbs pounds
mm millimeter
VX Methylphosphonothioic acid S-[2-[bis(1-methyl)amino]ethyl]-0-ethylester

2.2 Container Management Practices: R315-8-9.4

2.2.1 The Explosive Ordnance Disposal (EOD) personnel are responsible for range clearing operations, which generate the hazardous waste RRMs stored in Igloo G. Only the RRMs, which are known or suspected to contain CWM (P999), and considered to be in a safe condition to transport, will be designated for Igloo G storage. RRMs, which are damaged or otherwise considered unsafe for transport, are destroyed in place under an emergency plan approval destruct permit, and therefore are not placed in storage. EOD personnel are responsible for initial identification of waste type (if possible). The potential for the chemical agent and the type of chemical agent present is determined by the procedures described in Attachment 2-1 of this permit interpreting markings on the outer casing of the RRM. Under no circumstances is the outer steel casing of an RRM, which is suspected of containing P999 waste opened or breached by the EOD in an effort to identify the type of CWM present. Projectile-type RRMs are placed within prop charge cans or pigs for secondary containment. Prior to transport of RRMs containing suspected P999 waste to Igloo G,

documents are prepared which attach to and accompany each container. The documentation includes identification of suspected CWM, munitions data, explosive components (if present), and circumstances of turn-in for storage. Trucks along controlled, internal DPG roadways from the remote test ranges to Igloo G transport the RRMs.

2.2.2 The Igloo G manager is responsible for operations in Igloo G, as well as compliance with all hazardous waste storage requirements, including permit conditions. The Igloo G manager is informed of the movement and arrival of the RRMs containing suspected P999/D003 waste designated for storage in Igloo G. The Igloo G manager ensures that the identification information on each container matches the accompanying shipping document information before the RRM can be unloaded.

2.2.3 Extreme care is used at all times while unloading and handling these containers to ensure that the containers are not opened, handled, or stored in a manner that may cause them to rupture or leak. The containers are unloaded and manually placed in Igloo G, except for large items, which require a forklift.

2.2.4 Pigs, prop charge cans, and other overpacks are placed on containment pallets on the concrete floor of the igloo. The containers and pallets shall not be stacked, to ensure stability of the containers.

2.2.5 The walls of the igloo are stenciled with lines that establish an alphabetical grid, which is used to identify the location of each container in storage. The containers on pallets are stored in rows, which are perpendicular to the long walls of the igloo. Adequate aisle space shall be maintained between the rows within the igloo. Igloo G has a central aisle space of approximately 8 feet.

2.2.6 A magazine data card will be prepared for each container to identify its contents and the date it was placed in storage. Each container and/or overpack is provided with a railroad-type seal with a registered seal number to allow detection of unauthorized tampering. The containers cannot be opened without damaging this seal. The containers of RRM in Igloo G shall not be moved until an acceptable method for treatment or disposal is determined, except as necessary to determine the contents using a nonintrusive analytical method or to weigh the RRM containers (including overpacks) as required by the Executive Secretary.

2.2.7 The total number of containers which can be safely stored in Igloo G cannot be determined accurately due to the potential variation in size and weight of the RRMs discovered on the test ranges. As discussed in Section 2.1, the waste storage capacity of Igloo G is based on the combined weight of waste and product chemical agent rather than volume of waste or number of containers. The entire weight of each RRM is considered to be hazardous waste material. The storage capacity of Igloo G is based on a maximum of 4,160,000 pounds floor limit (combined weight of hazardous waste and product chemical agent), compliance with the aisle space, and stacking limitations described in this section. It is not expected that Igloo G will reach the maximum storage capacity since on average, less than five dud rounds are discovered on the test ranges on an annual basis, and not all of these are known or suspected to contain CWM P999 waste.

2.2.8 The following scenario describes the corrective action, which will occur if a container is found to be deteriorating or leaking at the time of an inspection. If an RRM, which is stored within a prop charge, can or pig is known to be leaking liquid (very unlikely) or vapor (detectable at very low concentrations), then the prop charge can or pig will be considered the primary container. The

entire container will be placed in a new, larger "overpack" pig and returned to storage on a containment pallet.

2.2.9 The procedures used to gain access to and operate Igloo G are conducted under the following standing operating procedures (SOPs):

- SOP DP-0000-L-652, Hazard Waste Storage Facility (Igloo G)
- SOP DP-0000-M-170, MGA1 Filter Operation at Toxic Chemical Agent Storage 3643 (Igloo G)
- SOP DP-0000-L-651, Receipt, Storage, Inventory, and Issue of Chemical Surety Materiel and Munitions
- SOP DP-0000-T-107, First Entry Monitoring of Toxic Chemical Agent Storage 3643 (Igloo G) and Monitoring Requirements for Chemical Agent. Fire Symbols 1 thru 4 and Chemical Hazard Symbols G, VX, H, and L
- SOP DP-0000-W-305, Storage Monitoring of Toxic Chemical Munitions; Bulk Toxic Chemicals and Storage Structures and Chemical Items
- Department of the Army, November 1990: Ammunition Surveillance Procedures; Supply Bulletin (SB 742-1).

2.2.10 Facility personnel involved in handling the hazardous wastes will be equipped with proper material handling and personal protective equipment (PPE) at all times. No employee shall handle hazardous waste unless proper safety equipment is available and the hazards are known. The training required for the personnel involved in Igloo G operations is described in Attachment 2-4 of this permit.

2.3 Secondary Containment System Design and Operation: R315-3-6.1(a), R315-8-9.6(a), R315-8-9.6(d)

2.3.1 Since the RRMs may contain free liquids under certain temperature conditions, all containers of known or suspected P999 hazardous waste within Igloo G will be stored within a portable secondary containment device (i.e., prop charge can or pig). The prop charge cans, pigs, or other overpack canisters are designed to completely contain the primary RRM container. They will always provide greater than 100 percent capacity of the volume of the primary container, and are required pursuant to Army regulations.

2.3.2 To comply with Utah hazardous waste regulations, all RRMs will be placed on containment pallets designed to capture any liquid leakage. A typical containment pallet drawing is provided in Figure 9-6. Typical containment pallets inside dimensions are 4 foot by 4 foot by approximately 7 inches. The total containment capacity rating of a typical pallet used in Igloo G is 12 gallons. This capacity is much greater than the maximum volume in the largest container stored on the pallet. Containment pallets (or other similar devices) with larger design capacities are available and will be provided as appropriate for larger RRMs or containers needing to be stored in Igloo G. Pallets are constructed with high-density polyethylene.

2.3.3 The sealed, airtight secondary containment overpack for each projectile RRM will consist of a steel cylinder which has a welded bottom cap and a screw-on or bolt-on, gasketed lid. The length and diameter of the cylinder will depend on the size of the primary container. The lid of the overpack may contain valved sample ports. A second larger pig of similar design may be used if a leak occurs in the primary container. Overpacks for bombs are aluminum aircraft fuel tanks, which have been modified to provide sealed containment for these RRMs.

2.3.4 The sealed, airtight overpack containers prevent releases and minimize potential problems of reactions between different wastes. The RRM was designed to contain CWM, has adequate storage, and is therefore an adequate and compatible container for storage of CWM. Only limited testing has been conducted to determine the effects of combinations of two different agents, and no formal technical assessments have been performed to determine compatibilities. There is no evidence that the mixing of different agents will produce a hazardous chemical reaction or chemical compound that is more hazardous than the original constituents. This limited testing did not produce any evidence of potential fast reactions between agents. The required procedure of storage of each RRM in its own individual secondary containment provides adequate segregation minimizing the potential for combination of agents. Secondary containment also allows for greater ease in recordkeeping, monitoring, and decontamination.

2.4 Requirement for the Base or Liner to Contain Liquids: R315-8-9.6(b)(1)

2.4.1 The prop charge cans, pigs and other overpacks will continue to be used. Both the containment pallets and the overpack containers, which serve as secondary containment for storage of the wastes in Igloo G, will be free of cracks, gaps, or deterioration which would potentially cause a release in the event of a leak in the primary container. The secondary containment system will be inspected on a regular basis. Any containment device found to be deteriorated shall be replaced. The overpack containers are required pursuant to military regulations. Containment pallets shall be considered to fulfill the regulatory requirement for secondary containment.

2.4.2 The secondary containment system is protected from precipitation since Igloo G is a completely enclosed structure designed to be weather tight. The structural components of Igloo G consist of: the head wall (where the only entrance is located); the back wall; the barrel-shaped roof structure; and the base. The head wall and back wall are constructed of concrete. The sliding entrance doors in the head wall are made of steel. There are two screened vents in the front wall and a roof vent at the top of the back wall. The roof vent is equipped with a cover to prevent inflow of precipitation. The barrel roof is constructed of steel reinforced concrete, and is semicircular in cross section resembling a half cylinder, which creates both the two sidewalls and the roof. All joints in the barrel roof contain water stops, and the entire outer surface is covered with membrane waterproofing to prevent infiltration of precipitation. The base or floor of the igloo is constructed of unsealed concrete and provides support for the secondary containment system. The floor area of the igloo is approximately 80 feet by 25 feet. The concrete floor has a nominal thickness of 6 inches. The floor slopes slightly from the long centerline toward the outside walls. Semicircular trenches 4 inches wide and 2 to 2.5 inches deep are formed into the concrete floor along each of the walls. The trenches slope toward the front (east) side of the igloo and exit through screened openings in the front wall. The outlets discharge to the concrete base of the unloading area. These outlets are not plugged and are a requirement of the igloo design. The outlets were designed to allow accumulated floor condensation to flow out of the igloo. This design is appropriate and necessary in areas with high precipitation and humidity. The climate at DPG has low precipitation and humidity and therefore, no accumulation of floor condensation has flowed outside the igloo. In addition, no decontamination activities have occurred to date in

Igloo G. All RRMs in Igloo G are contained in sealed canisters and are provided with adequate secondary containment pallets as discussed in Section 2.3.

2.4.3 The 6-inch thick reinforced concrete floor of Igloo G is supported by large concrete beams (described in Section 2.0). The floor is designed to support palletized ammunition in close-packed, 15,000-pound stacks, which would result in a maximum live load of 2,000 psf. Hazardous waste RRMs and related materials (pallets, canisters, and blastwalls) will produce an estimated maximum localized live load of 400 psf, which equates to 20% of the maximum design capacity of 2,000 psf.

2.4.4 Plan and elevation drawings of Igloo G are presented in Exhibit 2-3 (9 plates) of this permit. An engineering evaluation of the structural integrity of the base is not required since the igloo was designed and constructed to government specifications as shown in the drawings. In addition, the igloo is still being used for the purpose for which it was originally designed and constructed.

2.5 Containment System Drainage: R315-3-2.6(b) and R315-8-9.6(b)(2)

2.5.1 The RRMs will be completely contained within the prop charge cans, pigs, or other overpack canisters that serve as secondary containment while they are being stored. Leaks from a RRM would accumulate in the bottom of the canister and would be in contact with the primary container. However, since only a single container will be stored in each canister, the accumulated liquids would only contact an already damaged RRM.

2.5.2 All RRMs will be stored on containment pallets, which will contain 100 percent of the volume of the largest RRM on that pallet. Perforated decking will allow drainage of any liquid leakage into the containment volume.

2.6 Containment System Capacity: R315-8-9.6(b)(3)

2.6.1 If a prop charge can or pig is used as secondary containment, it will completely contain the primary RRM container and will always provide greater than 100 percent capacity of the volume of the primary container. In addition, the containment pallet capacity will be greater than 100 percent of the largest container or 10 percent of the all containers stored on it. Typical pallet containment capacity is 12 gallons. This capacity is much greater than the maximum volume in the largest 155-millimeter projectile (approximately 1-gallon) or the Levins projector (approximately 6 gallons).

2.7 Control of Run-On: R315-8-9.6(b)(4)

2.7.1 The secondary containment system (overpacks and containment pallets) is protected from run-on since Igloo G was constructed as a totally enclosed building. Run-on into the containment system is prevented by the floor of the igloo being raised at least 6 inches above the surrounding finish grade, and the concrete pad outside the entrance sloping away from the building toward the finish grade. In addition, the sealed prop charge cans, pigs and other containment canisters are elevated on pallets. Although the roof of the igloo is earth-covered, the concrete barrel is constructed with waterstop joints and a waterproof membrane. In addition, the igloo is surrounded by drain tile, which directs subsurface drainage away from the igloo.

2.8 Removal of Liquids from Containment System: R315-8-9.6(b)(5)

2.8.1 If a leak or spill occurs within a sealed prop charge can or pig, there will be no attempt made to remove the liquid. Instead, the secondary containment device containing the damaged primary container will be overpacked in a larger pig and placed back in storage.

2.8.2 If a leak occurs from a bomb inside a containment canister, there will be no attempt to remove the liquid (until final disposal plans are completed and approved). If agent vapor is being released into the ambient air, providing a second larger overpack for the original canister will stop the release.

2.8.3 If any suspected agent drips or CWM leaks from a projectile RRM into a containment pallet, a new larger overpack will be used to contain the leaker. The RRM will be placed on a clean pallet, and the contaminated pallet will be decontaminated in accordance with DPG SOPs prior to disposal reuse.

2.8.4 All personnel will wear appropriate PPE during any clean-up operations at Igloo G.

2.9 Containers without Free Liquids

2.9.1 All of the containers stored in Igloo G will be managed as containers containing free liquids. Therefore the requirements of this section are not applicable.

2.10 Control of Air Emissions from Containers: 40 CFR 264.1080-1083, 1086, and 1088-1090

2.10.1 Facilities storing containers with a design capacity greater than 0.1 cubic meters (m^3) are subject to standards for air emissions from containers. All containers with a design capacity less than or equal to 0.1 m^3 are exempt from the air emission standards. None of the containers in Igloo G storing RRMs exceed 0.1 m^3 in capacity; therefore, Igloo G is exempt from the air emission standards.

Figure 9-1. Plan View of Igloo G and the Outdoor Unloading Area.

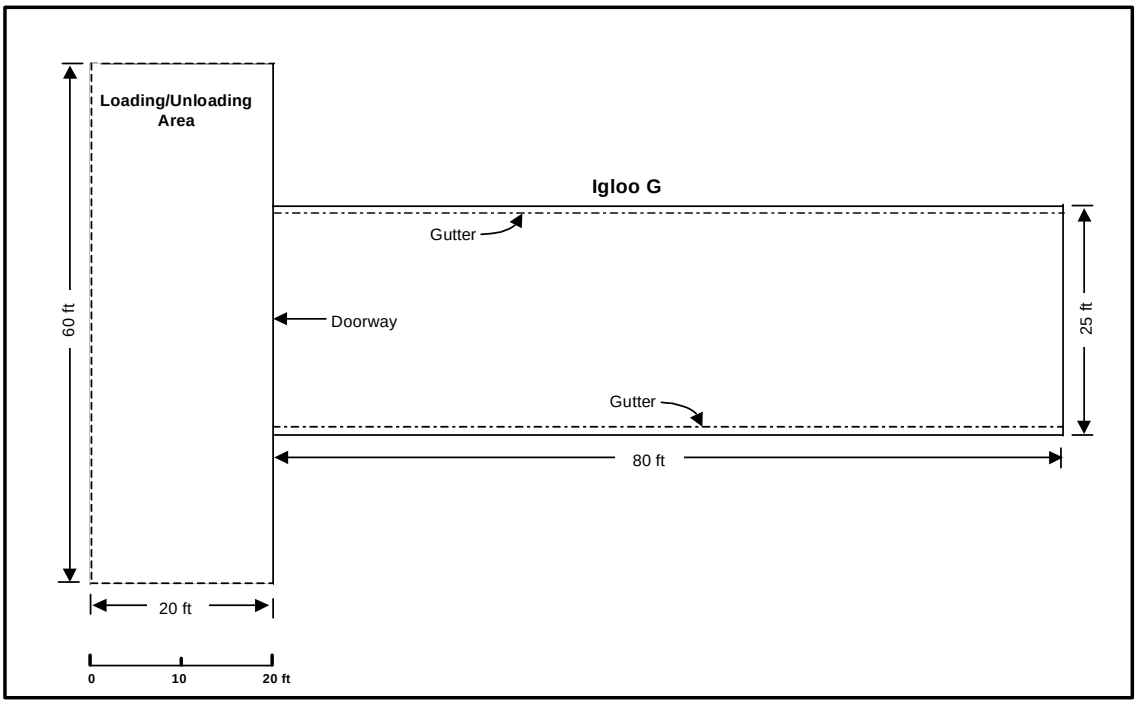
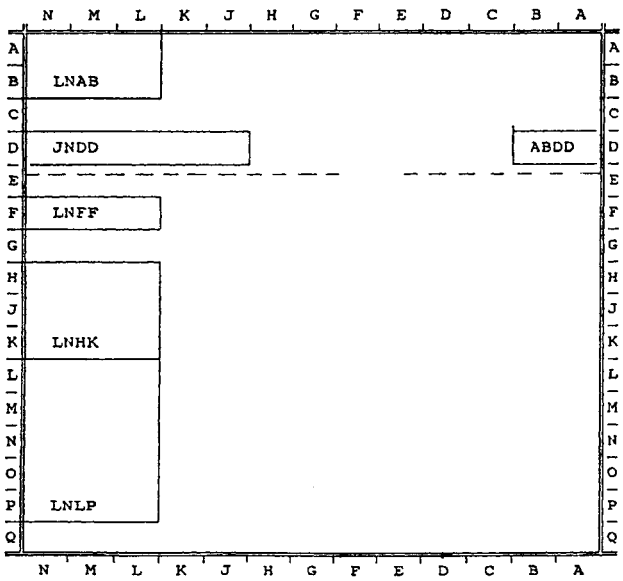


Figure 9-2. Location Key for Igloo G Planigraph.



LAT GRID = 2 FEET
LONG GRID = 5 FEET

STOCK NUMBER	NOMENCLATURE	LOT	GRID
131500X974821	4.4 W/O FUZE	UNKNOWN	LNAB
131500X975611	4.2 W/FUZE	UNKNOWN	JNDD
131500X975615	4.4 W/O FUZE	UNKNOWN	LNAB
131500X975616	105MM W/O FUZE	UNKNOWN	LNAB
131500X977266	105MM M60 W/FUZE	UNKNOWN	JNDD
131501X952044	105MM LEWISITE	UNKNOWN	ABDD
131501X952045	4.2 LEWISITE	UNKNOWN	ABDD
131500X978864	105MM W/O FUZE	UNKNOWN	LNAB
132000X976302	155MM T77 W/O FUZE	UNKNOWN	LNAB
132000X977271	8"/47 NAVY W/O FUZE	UNKNOWN	LNAB
132000X978347	155MM	UNKNOWN	JNDD
132500X974394	HEMISOHERE M139	UNKNOWN	LNAB
132500X984924	BOMB, GAS M125	UNKNOWN	LNAB
1365002773040	CHEMICAL, HD	UNKNOWN	LNFF
1365002773040	CHEMICAL, HD	RM-113-22	LNFF
1365002773041	CHEMICAL, HT	UNKNOWN	LNFF
1365002939239	CHEMICAL, GB	UNKNOWN	LNLP
1365002939239	CHEMICAL, GB	RM-5651-109BT	LNLP
1365005417209	CHEMICAL, VX	UNKNOWN	LNHK
1365005417209	CHEMICAL, VX	NY-1767-A26	LNHK
1365005417209	CHEMICAL, VX	NY-1767-A28	LNHK
1365005417209	CHEMICAL, VX	NY-1767-A29	LNHK
1365005417209	CHEMICAL, VX	NY-1767-A32	LNHK
1365005417209	CHEMICAL, VX	NY-1767-A35	LNHK
1365005973612	CHEMICAL, GD	UNKNOWN	LNLP
1365501X962058	CHEMICAL, EA1699	UNKNOWN	LNHK

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Exhibit 2-2
Location Key for Igloo G Planigraph

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Figure 9-4. Typical Propellant Charge Can Used for the Storage of Range Recovered Munitions (155-millimeter and 8-inch projectiles).

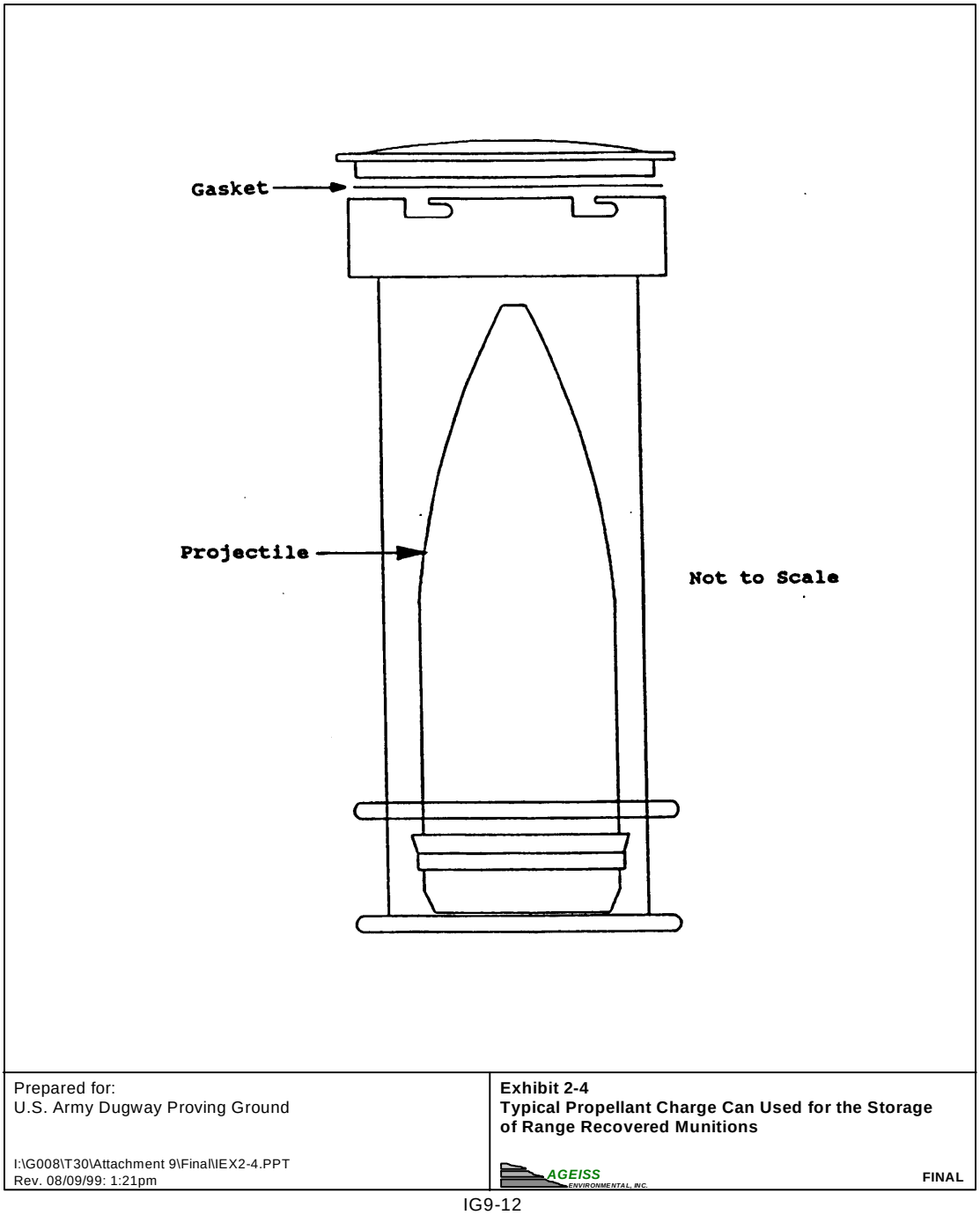

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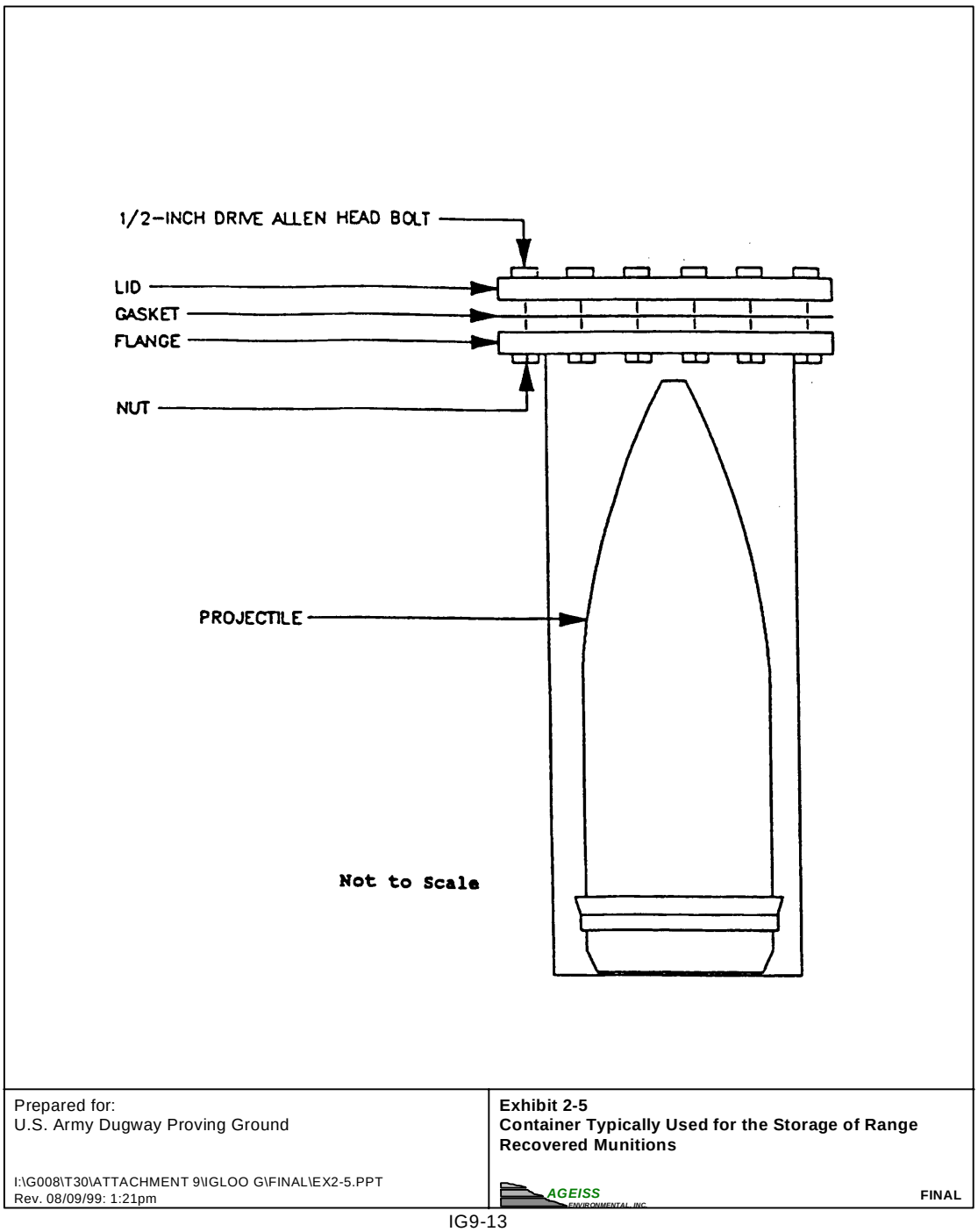
Figure 9-5. Container Typically Used for the Storage of Range Recovered Munitions (105-millimeter projectiles and 4.2-inch mortar projectiles).



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U.S. Army Dugway Proving Ground

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Exhibit 2-5
Container Typically Used for the Storage of Range Recovered Munitions

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Figure 9-6. Containment Pallet.